Evaluation of Adaptability of some Olive (*Olea europeae* L.) Cultivars in Different Climates of Iran

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ABSTRACT

Azimi, M., Arji, I., Zeinanloo, A. A., Taslimpour, M. R., and Ramazani Malakrodi, M. 2016. Evaluation of adaptability of some olive (*Olea europeae* L.) cultivars in different climates of Iran. **Seed and Plant Improvement Journal 32-1:** 275-292 (in Persian).

To evaluate compatibility of some native and imported olive cultivars, an experiment with nine cultivars was conducted in Tarom, Roudbar, Kazeroon and Sarpolezahab Olive Research Stations since 2004 for five years. The experiment was conducted in split plot based on randomized complete block design with three replications. Some flower and fruit characteristics such as the number of flowers per inflorescence, percentage of perfect flowers, fruit weight, fruit length and diameter, flesh to stone ratio, oil percentage in dry matter of fruit, fruit yield per tree and yield efficiency were measured. Combined analysis of variance showed, significant differences in each location during five years. Significant differences were also observed among the cultivars for different traits in each location. Based on the results of five years experiments, in Kazeroon Research Station, cv. Konservolia with high yield and flesh-stone ratio was recognized as a dual purpose cultivar, and cv. Amigdalolia with high oil percentage and yield, as an oily cultivar. In Sarpolezahab Research Station, cv. Konservolia was also recognized as dual- purpose cultivar and in Tarom Research Station, cvs. Konservolia and Zard were determined as dual purpose and cvs. Koroneiki and Arbequina as oily cultivars.

Key words: Olive, imported cultivars, yield efficiency, flower and fruit characteristics, oil percentage.

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Effect of Pollen on Quantitative and Qualitative Charcteristics of Date Fruit (*Phoenix dactylifera* L.) cv. Shahani

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ABSTRACT

Khajehpour Tadavani, A., Arzani, K., Zargari, H., and Sarikhani Khorami, S. 2016. Effect of pollen on quantitative and qualitative charcteristics of date fruit (*Phoenix dactylifera* L.) cv. Shahani. **Seed and Plant Improvement Journal 32-1:** 293-310 (in Persian).

Pollination as one of the most important management factors in date orchards is playing a crucial role in improving fruit quality and yield. The aim of this experiment was to determine the best pollinizer for Shahani date cultivar in Jahrom Agricultural Research Stations, Fars and Tarbiat Modares, University, Tehran, during 2012-2013. To determine the most compatible pollinizer to Shahani date, the first experiment was conducted in randomized complete block design with six treatments (Jahrom native pollen, Darab native pollen, Ghir and Karzin native pollen, Larestan native pollen, Frashband native pollen and tissue culture Boyer 11 pollen) and four replications. To investigate the viability of pollen, the second experiment was carried out in completely randomized design with six pollinizer treatments and four replications. The results of the first experiment showed that the effect of different pollinizer treatments on fruit set, yield, length, diameter, weight and volume of fruit was significant. The highest percentage of fruit set and yield was observed in the Larestan rootstocks and Larestan and Darab pollinizer treatments, respectively. Contrast to fruits ash and moisture content, pH and juice acidity, effect of different pollinizer treatments on flesh weight to stone ratio and TSS was significant. Based on the second experiment results, there were significant differences among studied pollinizers in term of pollen germination percentage. The highest and lowest pollen germination percentage was related to the Larestan and tissue culture Boyer 11 pollinizer male palm, respectively. Generally, the results showed that Larestan and Darab native pollens are the most suitable pollinizer cultivar for Shahani date in Jahrom areas of Iran.

Key words: Date palm cv. Shahani, Pollen germination, Pollinizer cultivar, Pollination.

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Genetic Diversity of Ecotypes of Horse Mint (*Mentha longifolia*) in Southwest of Iran using Morphological Traits

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ABSTRACT

Azarkish, P., Moghaddam, M., Vaezi, J., Ghasemi Pirbalouti, A., and Davarinejad, Gh. 2016. Genetic diversity of ecotypes of horse mint (*Mentha longifolia*) in southwest of Iran using morphological traits. **Seed and Plant Improvement Journal 32-1:** 311-329 (in Persian).

Horse mint (*Mentha longifolia* syn. *Mentha sylvestris*) is one of the valuable medicinal and aromatic plants belongs to Lamiaceae family. To evaluate diversity of horse mint in southwest of Iran, 35 ecotypes from six provinces of Lorestan, Fars, Khuzestan, Isfahan, Kohgilouye va Boyerahmad and Charmahal va Bakhtiari were examined. To assess the morphological traits at flowering stage, ten plants were selected in each habitat and 17 qualitative and quantitative morphological traits for each ecotype were assessed. The results showed that there was a vast diversity among the ecotypes. Cluster analysis divided ecotypes into four groups. Factor analysis classified traits into four major components which justified 81.5 percent of the total of variance. Number of branches, number of flowering shoots, number of nodes and leaf number were the first component. Plant height had a significantly positive correlation with main shoot diameter and number of nodes. Generally, the results of this study showed that ecotypes no. 6 and 13 (Lorestan and Fars) due to good characteristics and high amount of essential oil have good potential for domestication of this species.

Key words: Horse mint; ecotype; diversity; morphological traits; cluster analysis.

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Comparison of Total Phenolic Contents of the Leaves and Fruits of Quince Genotypes and its Effects on the Fire Blight Resistance

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ABSTRACT

Ghozati, E., Abdollahi, H., and Piri, S. 2016. Comparison of total phenolic contents of the leaves and fruits of quince genotypes and its effects on the fire blight resistance. **Seed and Plant Improvement Journal 32-1:** 331-345 (in Persian).

Phenols are important secondary metabolites with important role in tolerance to the environmental stresses, and quince leaves and fruits are significant sources of phenolic compounds. The current research was conducted to study the contents and variations of total phenolic compounds in the leaves and fruits tissues of selected quince genotypes from Isfahan and investigate its eventual role in the fire blight resistance in this species.Twelve quinces genotypes, KVD4, SHA1, KVD3, PH2, ET1, NB3, KVD1, KM1, SVS1, SVS2, NB2 and cv. Isfahan as control were evaluated.The ethanol extracts of the leaves and fruits were prepared during spring and summer and total phenol contents were determined by the folin-ciocalteu method, based on equivalent gallic acid. The results showed differences in phenolic compounds in the leaves, of the genotypes, so that genotype KVD4 and cv. Isfahan, with 17.8 and 2.7 mg gallic acid/g fresh weight of the leaves, had the highest and lowest total phenols, respectively. Also a constant increase was observed in the phenol contents of the leaves up to end of the summer. On the other hand, no significant difference was found between the amounts of total phenols in fruits of genotypes. The evaluation of phenol content as major components of non-enzymatic anti-oxidative defense system, against fire blight invasion showed negative correlation of I_{sv}, with phenolic contents of the quince leaves from early summer.

Key words: *Cydonia oblonga*, gallic acid, *Erwinia amylovora*, phenol, fire blight.

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Evaluation of Partial Resistance Components in some Promising Wheat Lines of Cold Climate Zone to Yellow Rust Disease in Field Condition in Ardebil, Iran

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ABSTRACT

Dolatkhah Ajirloo, T., Torabi, M., and Safavi, S. A. 2016. Evaluation of partial resistance components in some promising wheat lines of cold climate zone to yellow rust disease in field condition in Ardebil, Iran. **Seed and Plant Improvement Journal 32-1:** 347-367 (in Persian).

A set of 21 bread wheat lines of cold climate zone of Iran, along with two susceptible check cultivars were studied to determine their partial resistance to yellow rust. Different components of partial resistance including coefficient of infection (CI), final rust severity (FRS), relative area under disease progress curve (rAUDPC), and apparent infection rate (*r*) were evaluated at both seedling and adult plant stages under field conditions. Lines C-91-9, C-91-20 and susceptible checks had the highest values of rAUDPC, FRS, CI, *r*, pustule density and pustule size. Lines C-91-1, C-91-7, C-91-8, C-91-15 and C-91-18 were resistant or had low infection at both seedling and adult plant stages. Lines C-91-12 and C-91-21 were susceptible at seedling stage, but showed resistance reaction or low infection at adult plant stage. These lines seem to have slow rusting (partial) resistance. Lines C-91-13 and C-91-14 were moderately resistant at seedling and resistant at adult plant stage, while lines C-91-3, C-91-4, C-91-16 and C-91-17 had moderate level of partial resistance and C-91-2, C-91-5, C-91-6, C-91-9, C-91-10, C-91-11, C-91-19 and C-91-20 were susceptible. Positive and significant correlations were observed between FRS and CI and also between rAUDPC and apparent infection rate. The highest coefficient of correlation (r) was observed between FRS with CI (r = 0.99).

Key words: Wheat, yellow rust, partial resistance, seedling resistance, adult plant resistance.

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Effect of Homologous Genomes on Unreduced Gamete Formation in wheat and Aegilops Crosses

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ABSTRACT

Fakhri, Zh., Mirzaghaderi, Gh., Ahmadian, S., and Badakhshan, H. 2016. Effect of homologous genomes on unreduced gamete formation in wheat and Aegilops crosses. **Seed and Plant Improvement Journal 32-1:** 369-381 (in Persian).

Production of unreduced gametes during meiosis is common among interspecific hybrids of plants. In the present study, two cultivars of bread wheat (2n = 6x = 42, AABBDD)were reciprocally crossed with *Aegilops triuncialis* (2*n* = 4*x* = 28; $U^tU^tC^tC^t$) and *Ae. cylindrica* (2*n* = 4*x* = 28; $C^cC^cD^cD^c$) to produce 20 interspecific hybrid combinations. The hypothesis was that unreduced gamete formation in *T. aestivum* × *Aegilops triuncialis* (2n = $ABDU^tC^t$; which lack a common subgenome) is more than that of *T. aestivum* × *Ae. cylindrica* (2n = $AB\underline{DD}^cC^c$) hybrids. This hypothesis was supported by the estimation of unreduced gametes in F_1 hybrids. These results showed that lack of homologous genomes in *T. aestivum* × *Ae. Triuncialis* led to meiotic restitution in 3% of pollen mother cells (PMCs) resulting in unreduced gamete formation and F_2 seed production.

Key words: Wheat, interspecific hybridization, polyploidy, unreduced gamete, pollen viability.

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Determination of Self and Cross-(In) Compatibility of some Asian Pear (*Pyrus serotina* Rehd.) and European Pear (*Pyrus communis* L.) Cultivars Native to Iran

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ABSTRACT

Sheikhi, A., Arzani, K., and Kousheshsaba, M. 2016. Determination of self and cross-(in) compatibility of some Asian pear (*Pyrus serotina* Rehd.) and European pear (*Pyrus communis* L.) cultivars native to Iran. **Seed and Plant Improvement Journal 32-1:** 383-401 (in Persian).

In order to determine the self and cross-(in)-compatibility of nine Asian pear and two European pear cultivars native to Iran, two experiments were conducted based on complete randomized block design in two consecutive years (2012-2013). This study was performed in the experimental pear orchard in the Tarbiat Modares University, Tehran. Controlled pollination method was used in orchard and then pollen tube growth analysis by fluorescence microscopy was studied. Fruit set percentage was calculated 15, 35 and 75 days after full bloom. Pollinated flowers were picked 48, 72, 96 and 120 hours after pollination, fixed in FAA solution and stored at 4 ˚C until microscopic studies. Results showed that 'KS9' had the highest and 'Sebri' the lowest fruit set (7.85 and 0 % respectively). Results of controlled pollinations showed that the cultivars 'Shahmiveh', 'Sebri', 'KS13' and 'KS7' were self-incompatible and others were self-compatible.It can be concluded that cultivars 'KS6', 'KS12' and 'KS13' are cross-compatible, because their pollen tubes reached the ovaries 96h after pollination and the final fruit set was more than 8.98%.

Key words: Asian pear, gametophytic self-incompatibility, controlled pollinations, fluorescence microscopy, pollen tube growth.

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Evaluation of Genetic Parameters of Important Agronomic Traits of Sesame in Irrigated and Water-Limited Conditions using Diallel Cross Method

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ABSTRACT

Mansouri, S. 2016. Evaluation of genetic parameters of important agronomic traits of sesame in irrigated and water-limited conditions using diallel cross method. **Seed and Plant Improvement Journal 32-1:** 401-425 (in Persian).

In this study, half diallel cross method with Grifing method II and model mixed B was used to evaluate genetic parameters for physiological and morphological traits in seven lines of sesame and their 21 F2 populations under normal irrigation and water limited (water withholding before flowering) conditions. Mean of evaluated GCA/SCA under normal irrigation indicated that days to flowering, days to end of flowering, flowering duration, days to maturity, number of capsule per main stem, 1000-seed weight, main stem yield, capsule length, internode lengh, number of infertile nodes, number of capsule bearing nodes, and total number of nodes were mostly controlled by additive gene effects, some by non-additive gene effects and in some cases by a balance between the two genes mode of actions. Heritability in the broad sence varied from 58.4% for internode length to 97.7% for number of capsule per plant. Narrow sense heritability was high for number of capsule per plant (82.5%) and days to maturity (80.5%), indicated high selection efficiency for these traits under water limited condition. All the evaluated traits were governed by additive effects which indicated a shift in genetic control of the traits compared to normal irrigated condition. Broad sense heritability appeared to be unchanged but evaluation of narrow sense heritability was lower in water limited condition compared to normal irrigated, which may indicate reduction in breeding progress rate.

Key words: Sesame, yield, diallel cross, genetic mechanisms, general combining ability, specific combining ability.

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Scientific Short Article

Evaluation of Cell Membrane Stability in Selected Bread Wheat (*Triticum aestivum* L.) Cultivars under Late Spring Low Temperature Stress

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ABSTRACT

Asadi, A. A., and Mirfakhraii, R. Gh. 2016. Evaluation of cell membrane stability in selected bread wheat (*Triticum aestivum* L.) cultivars under late spring low temperature stress. **Seed and Plant Improvement Journal 32-1:** 431-435 (in Persian).

The low temperature is one of the most important factors limiting the growth, production and geographical distribution of plants. This stress may occur as chilling, freezing, and late spring low temperature. In spring, simultaneously with the beginning of wheat growth, tolerance to low temperatures is reduced and may be faced with decreasing temperature at any stage of its growth and damaged. This type of sudden temperature drop in spring is known as late spring frost. This investigation evaluated cell membrane stability in selected cultivars of bread wheat that affected by late spring low temperature, in 50-68 Zadoks codes. The experiment was carried out in a randomized complete block design with two factors, 13 cultivars and three late spring low temperature treatments including +8 (control), 0, and -2°C. Membrane lipid peroxidation and electrolyte leakage were analyzed as the most cell membrane stability indices. Regarding to significant differences at the 5% probability level for genotype × stress interactions in traits, comparison of means showed that there were various responses among the cultivars. Finally, based on the results, cv. Pishgam was assessed as resistant and cv. Sivand susceptible to late spring low temperature according to the amounts of measured indices.

Key words: Wheat, cultivars, cold stress, membrane stability, electrolyte leakage, lipid peroxidation.

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